

# Awareness of IT applications in Healthcare

Nikhita Mangaonkar  
Assistant professor  
Sardar Patel Institute of Technology  
Andheri, Mumbai

Sunny Nahar  
Assistant Professor  
Vivekanand Institute of Technology  
Chembur Mumbai

Abhishekh Chinarkar  
III/I MBBS student  
MIMER Medical College  
Talegaon (D), Pune.

Sudarshan Sirsat  
Assistant Professor  
Thakur Institute of Management Studies, Career  
Development and Studies  
Kandivali, Mumbai

## ABSTRACT

Healthcare systems in India are constantly facing difficulties as the patient load is huge compared to healthcare providers and thus management of OPD, IPD cases (from scheduling appointments to providing medical care) is cumbersome. Information Technology can be used potentially to improve the quality of healthcare sector in India. Public and Government hospitals still prefer the manual processes and use of IT is avoided. Two major factors creating hurdle in application of IT are cost and complexity of usage.

## General Terms

Healthcare domain, healthcare industry, IOT (Internet of things), IT applications, Healthcare applications, information system.

## Keywords

Healthcare, practitioner, domain, Information technology IT, Electronic medical records EMR

## 1. INTRODUCTION

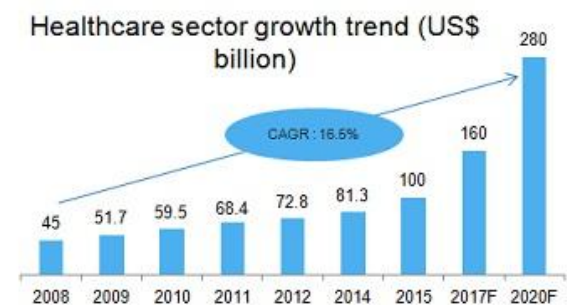
In today's era of technology, where the communication is fast growing for betterment of humans, IT has the quality potential safety to enhance efficiency of the healthcare. It seems relatively it's not been well adopted by all the areas. Most of the Health care in India still prefers to work on the processes manually. The cost revolves round the IT and its adaptability by the work processes, culture, ensuring those physicians, nurses, and other staff use and accepts it, makes it difficult to implement.

It becomes necessary to understand what reasons hinder healthcare to avoid IT. Reasons could be Lack of compatibility with the technology, its implementation understanding, the work flow, cost etc. Thus it becomes a matter of importance to spread awareness about the different applications of IT in healthcare.

To deliver the best quality in the healthcare, it requires integration of technology and expertise. This collaboration requires information from different sources to have an access to right information; it will increase the efficiency of physicians, technicians, clinical researchers, doctors, nurses to easily access the correct information about their patients to improve its care. Also the patient can convey information in a better manner. Thus making IT desirable to use in a healthcare.

## 1. Growth in Healthcare industry:

- Public and private sectors both are interested in investing at Healthcare industry/Domain because of its high end socio economical aspect.
- During 2008-20, the expected to growth rate of 16.5 per cent will be achieved.
- The industry is expected to jump over 160 billion USD in the year 2017 and 280 billion USD in the year 2020.
- Ministry of Health is targeting 50 healthcare technologies in the financial year 2016 for the treatment of disease like Cancer & TB.
- The industry will achieve strong growth in multi dimensional aspects in the current and future scenario[6].



Source: Frost & Sullivan, LSI Financial Services, Deloitte, TechSci Research

Notes: E - Estimate, F - Forecast, CAGR - Compound Annual Growth Rate

Fig. 1. Healthcare sector growth trends in US\$ billion<sup>[1]</sup>

## 2. Growth in per capita healthcare expenditure

- Estimated Per capita healthcare expenditure is with the growth rate of 5% during financial year 2008–15 to 68.6 billion USD by 2015.
- Greater Awareness in personal health and hygiene is there with rise in income and high quality facilities.
- Healthcare insurance and other correlated domains are supporting public and private health and even public and private players to spend more on per capita expenditure.

- iv. Easy to afford medical facilities and drugs are improving the economic prosperity in the market.
- v. Good network of hospitals and easy to access technologies are the key controllers for per capita expenditure<sup>[1]</sup>.

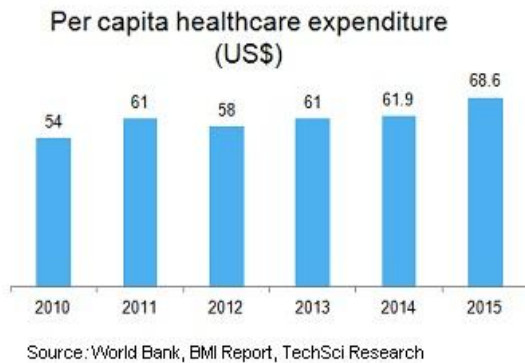


Fig. 2. Per capita healthcare expenditure in US\$<sup>[7]</sup>

Above two sections clearly indicates that the healthcare industry/domain is strong and capable of promoting the use of IT in all the sectors of market. Per capita income shows the readiness of individual to spend time and money on his health and hygiene issues, in which services can be enhanced with use of Information Technology including mobile and personnel devices<sup>[1]</sup>

Below diagram helps us in comparing study of healthcare growth and market break-up by revenues.

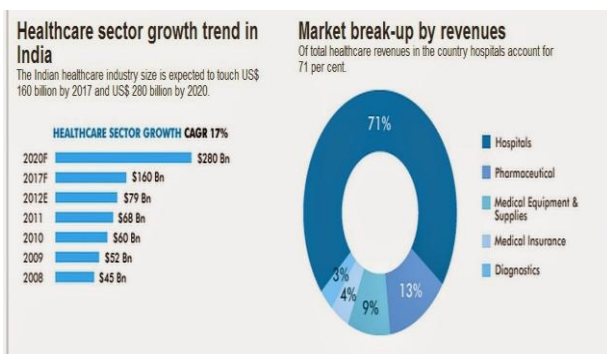


Fig. 3. Comparative study of Healthcare Sector growth trend in India and Market break-up by revenues

Hospitals contribute the most in overall revenues generated by total healthcare sectors revenue. Then the pharmaceutical followed by medical equipment and supplies, medical insurance and diagnostics.

If hospitals and pharmaceuticals shows there readiness in accepting Information Technology in wide areas of their own then the overall Healthcare sector will automatically accept IT in their core practices and services provided by healthcare domains<sup>[2]</sup>.

## 2. PROBLEMS IN ACCEPTING IT IN HEALTHCARE PRACTITIONERS

Below we have mentioned some general issues which we may have to face in order to empower Information Technology in all the perspective healthcare domains:

1. Time issues
2. Awareness of IT
3. Technology phobia
4. Availability of domain specific IT applications
5. Availability of Handheld devices
6. Security issues
7. Privacy issues
8. Customer acceptance level
9. Automation in general medical practices and services
10. Economical aspects
11. Ethics committees

## 3. SCOPE OF IT APPLICATIONS IN HEALTHCARE DOMAIN

IT helps the healthcare electronically to collect, retrieve, store and analyze the information. One of the primary motivators for a using many IT applications in the healthcare is the belief that they improve the quality of patient care. It also helps the physicians, nurses, doctors, clinical technician to take right decision and right time. However research states that it's of vital importance to understand what are the different IT applications that can be used in improving health care. Following are the current technologies that been used:

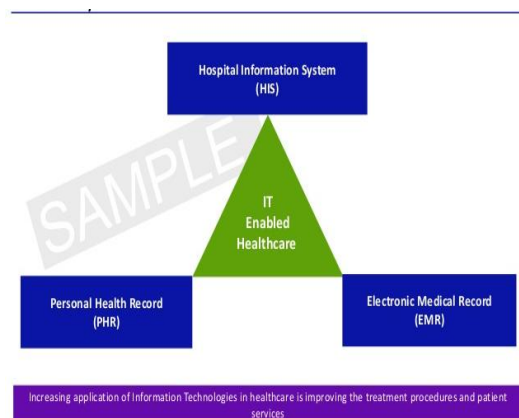


Fig. 4. applications of Information Technology in Healthcare- Summary<sup>[4]</sup>

To IT enable Healthcare there are three prominent areas as mentioned below:

1. Hospital Information System (HIS)
2. Personnel Health Records (PHR)
3. Electronic Medical Records (EMR)

There are many more but these three covers the most dimensions of healthcare issues as general classification<sup>[4]</sup>.

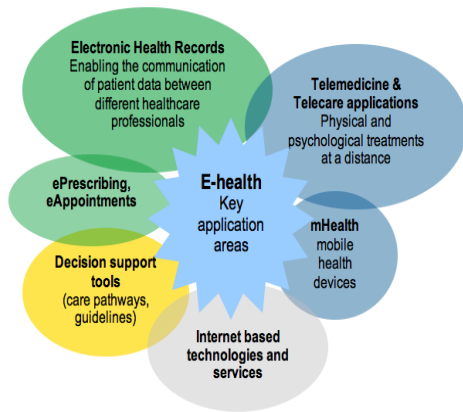


Fig. 5. Key application areas in E-health<sup>[5]</sup>

1. *Electronic Health Records*- Complete medical history can be included in one single record which can be accessed by the physician whenever required. Maintenance of records (especially medico legal cases) becomes easier.
2. *Patient management*- Scheduling appointments, diagnostic tests, monitoring patient's vital signs, record of prescriptions, treatment and other medical procedures can be done. Patient can be sent reminders about follow-up and further therapy.
3. *Research and other purposes*: Patient data can be used for research, statistics to formulate healthcare policies.
4. *Clinic Management*: Integrate laboratories and clinics which will help in reducing turnaround time of reports, sharing reports for second opinion, insurance claims and to other authorities.
5. *Financial management*: Billing process can be simplified including cost of procedure, medicines, insurance eligibility.
6. *Pharmacy*: Better control, transparency and accurate dispensing of medicines can be done. Records of prescribed drugs can be maintained.
7. *Monitor patients' vital signs in hospital rooms and at home*.
8. *Implant computerized devices* (e.g., Pacemakers) that allow patients to live longer.
9. Use computer-controlled devices during operations that require great precision (e.g., laser eye surgery and heart surgery).
10. *Use of computer-aided surgery* for training prior to performing surgery on live humans.
11. *Telemedicine* through computers with videoconferencing facility
12. *ePrescribing*: access to prescribing options, printing prescriptions to patients and sometimes electronic transmission of prescriptions from doctors to pharmacists.
13. *Health knowledge management* –it has medical journals, guidelines for help.
14. *Virtual healthcare teams*: consisting of healthcare professionals who collaborate and share information on patients through digit
15. *mHealth*: includes the use of mobile devices in collecting aggregate and patient level health data, providing healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vitals, and direct provision of care (via mobile telemedicine);
16. *Medical research using grids*: powerful computing and data management capabilities to handle large amounts of heterogeneous data.
17. *Automated dispensing machines (ADMs)*: This technology distributes medication doses.
18. *Clinical decision support system (CDSS)*: CDSS provides physicians and nurses with real-time diagnostic and treatment recommendations. The term covers a variety of technologies ranging from simple alerts and prescription drug interaction warnings to full clinical pathways and protocols. CDSS may be used as part of CPOE and EHR.
19. *Electronic materials management (EMM)*: Health care organizations use EMM to track and manage inventory of medical supplies, pharmaceuticals, and other materials. This technology is similar to enterprise resource planning systems used outside of health care
20. *Picture archiving and communications system (PACS)*: This technology captures and integrates diagnostic and radiological images from various devices (e.g., x-ray, MRI, computed tomography scan), stores them, and disseminates them to a medical record, a clinical data repository, or other points of care.
21. *Hybrid operating rooms*: While hybrid ORs may seem like newer technology, the concept has actually been around for more than 20 years.
22. *Ultrasound imaging devices*: Real-time Ultrasound imaging can be used to visualize internal organs for faster and accurate diagnosis and for assessing prognosis of the patient.
23. *Infection Detecting Devices*: Technology using molecular methods can be used for detecting infections, especially drug resistant bacteria.
24. *3D printing*: this technology has the potential for complete transformation of healthcare sector. From medical models to blood vessels, tissues, prosthetics for joint replacement, etc 3D printing can radically transform the quality of healthcare provided to the patients<sup>[5]</sup>.

#### 4. PROPOSED SOLUTIONS TO PROMOTE IT AWARENESS AMONGS HEALTHCARE PRACTITIONERS

These are some of the proposed solutions in order to promote use of IT in healthcare practitioners, pharmaceuticals and healthcare device manufacturers etc.

1. Motivating healthcare practitioners for using IT in daily services provided by them.
2. Development of doctor friendly mobile apps and other IT applications
3. Providing more robust technology to make it easy for naive users.

4. Develop the domain specific applications so that people in that domain will feel homely with the environment.
5. Government should provide the basic facilities in order to accommodate Information Technology easily in government and private hospitals.
6. Database should be developed and stored on cloud in order to share them with all the stakeholders in order to increase the availability.
7. Procedures and processes should be developed so that ethics committees of various government and private hospitals and other healthcare service providers should easily and ethically accept them.

## **5. CONCLUSIONS**

Applications of IT for healthcare providers helps to manage patient with secure data. By electronically saving data like health records and is made available whenever needed in a cost effective way. Also, the applications help to give accurate and complete information during medical emergency. It helps to diagnose the health problems at an early stage. Various new and emerging technologies can take healthcare domain to certain reliable state of art. Technology like internet of things, big data, r-programming will make healthcare sector stronger in future and will help taking care of patient to the next higher level. Applications embedding these technologies will be the choice of all type of patients or even normal people by choice and not by force.

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